

WHAT IS CLAIMED IS:

1. A method for designing a fibrous non-woven mat production, the method comprising:
 - selecting various physical characteristics for at least some of the components to be included in the mat;
 - obtaining empirical performance data relating to the mat based on the selected physical properties;
 - developing a prediction equation for a performance characteristic of the mat based on the empirical data and the physical characteristics;
 - calculating performance characteristics using the prediction equation, wherein ranges of at least some of the physical characteristics are used in the prediction equation; and
 - selecting components for the mat based on the calculated performance characteristics.
2. The method according to claim 1, wherein the empirical performance data is selected from a group consisting of tear strength, tensile strength and dispersion.
3. The method according to claim 1, wherein one of the components comprise glass fiber, and wherein the physical characteristics are selected from the group consisting of fiber length, fiber diameter, and sizing formulation.
4. The method according to claim 3, wherein one of the components comprises a binder, and wherein the physical characteristic comprises binder content by percentage weight.
5. The method according to claim 1, wherein the prediction equation is developed using a regression analysis.
6. The method according to claim 3, wherein the ranges of fiber length vary from about 1.2 inches to about 1.7 inches.
7. The method according to claim 3, wherein the ranges of fiber diameter vary from about 14 micrometers to about 20 micrometers.

8. The method according to claim 4, wherein the ranges of binder content by weight vary from about 14 percent to about 18 percent.

9. The method according to claim 3, wherein the fiber length is about 1.5 inches and the fiber diameter is about 14.5 micrometers.

10. The method according to claim 4, wherein the binder content by weight is about 12 percent.

11. A system for designing a fibrous non-woven mat production, the system comprising:

- a processor to develop a prediction equation to calculate one or more production component values based on a performance characteristic value, wherein the prediction equation is developed from data on a performance characteristic of the mat generated by one or more designed experiments; and

- a mat production design comprising one or more production values calculated from a desired performance characteristic value input into the prediction equation.

12. The system of claim 11, wherein the performance characteristic is selected from the group consisting of tear strength, tensile strength and dispersion.

13. The system of claim 11, wherein the one or more production components are selected from the group consisting of a materials characteristic and a production characteristic.

14. The system of claim 11, wherein the mat comprises glass fiber, and the one or more production components are selected from the group consisting of fiber length, fiber diameter, and sizing formulation.

15. The system of claim 11, wherein the mat comprises a binder, and the one or more production components includes binder content by percentage weight.

16. The system of claim 14, wherein the fiber length has a range from about 1.2 inches to about 1.7 inches.

17. The system of claim 14, wherein the fiber diameter has a range from about 14 micrometers to about 20 micrometers.

18. The system of claim 15, wherein the binder content by weight has a range from about 14 percent to about 18 percent.

19. The system of claim 11, wherein the prediction equation is developed using a regression analysis.

20. The system of claim 11, wherein the processor is a computer.

21. A method for designing a fibrous non-woven mat production, the method comprising:

- selecting physical characteristics for at least some components to be included in the mat, wherein the components include glass fibers and binder, and wherein the physical characteristics include length and diameters of the glass fiber and content, by percentage weight, of the binder;

- obtaining empirical performance data relating to the mat based on the selected physical properties, wherein the empirical performance data is selected from the group consisting of tear strength, tensile strength and dispersion;

- developing a prediction equation for a performance characteristic of the mat based on the empirical data and the physical characteristics;

- calculating performance characteristics using the prediction equation, wherein ranges of at least some of the physical characteristics are used in the prediction equation; and

- selecting components for the mat based on the calculated performance characteristics.